Volunteer Lake Assessment Program Individual Lake Reports

LOCKE LAKE, BARNSTEAD, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	2,039	**Max. Depth (m):**	2	**Flushing Rate (yr^{1})**	9.9
Surface Area (Ac.):	149	**Mean Depth (m):**	0.8	**P Retention Coef:**	0.59
Shore Length (m):	8,140	**Volume (m^{3}):**	466,700	**Elevation (ft):**	639

TROPHIC CLASSIFICATION

Year	Trophic class
2010	MESOTROPHIC

KNOWN EXOTIC SPECIES

Variable Milfoil

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm

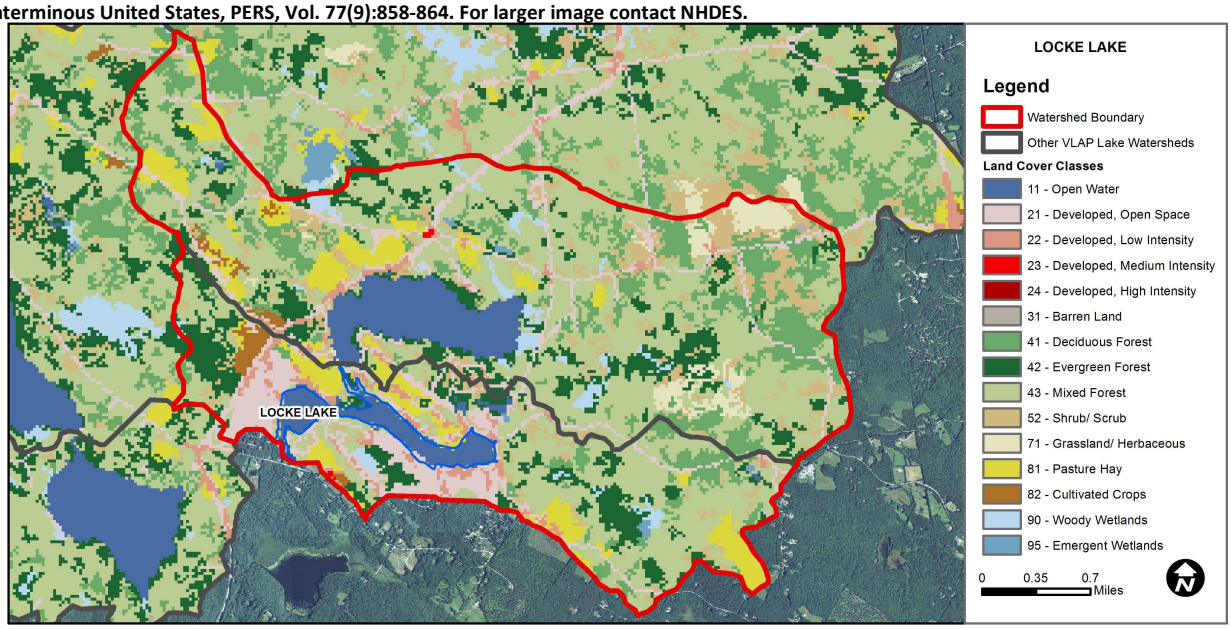
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Cautionary	The calculated median is fewer than 5 samples but > indicator and the chlorophyll a indicator is okay. More data needed.
	pH	Bad	>10%, with a minimum of 2, samples exceed criteria, with 1 or more by a large margin.
	Oxygen, Dissolved	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Dissolved oxygen satura	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Chlorophyll-a	Cautionary	The calculated median is fewer than 5 samples but > indicator. More data needed.
Primary Contact Recreation	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.
	Cyanobacteria hepatoto	Slightly Bad	Cyanobacteria bloom(s).
	Chlorophyll-a	Very Good	There are a total of at least 10 samples with 0 exceedances of indicator.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

LOCKE LAKE -N SHORE RD BEACH	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.
LOCKE LAKE - NORTH BARNSTEAD ROAD BEACH	Escherichia coli	Cautionary	There are no geometric means and there is one single sample exceedance. More data needed.
LOCKE LAKE - WINCHESTER DRIVE BEACH	Escherichia coli	Good	There are geometric means and all geometric means are < geometric mean criteria; and there has been a single sample exceedance.
LOCKE LAKE - VARNEY BEACH	Escherichia coli	Good	There are geometric means and all geometric means are < geometric mean criteria; and there has been a single sample exceedance.
LOCKE LAKE - POINT BEACH	Escherichia coli	Good	There are geometric means and all geometric means are < geometric mean criteria; and there has been a single sample exceedance.
LOCKE LAKE - GEORGETOWN BEACH #6	Escherichia coli	Good	There are geometric means and all geometric means are < geometric mean criteria; and there has been a single sample exceedance.
LOCKE LAKE - COLONY BEACH	Escherichia coli	Bad	There are >=1 exceedance(s) of the geometric mean and/or >=2 single sample criterion exceedances. One or more exceedance is >2X criteria.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	7.34	Barren Land	0.03	Grassland/Herbaceous	2.31
Developed-Open Space	9.43	Deciduous Forest	11.87	Pasture Hay	6.93
Developed-Low Intensity	2.16	Evergreen Forest	11.7	Cultivated Crops	0.96
Developed-Medium Intensity	0.06	Mixed Forest	37.54	Woody Wetlands	1.82
Developed-High Intensity	0	Shrub-Scrub	7.54	Emergent Wetlands	0.3

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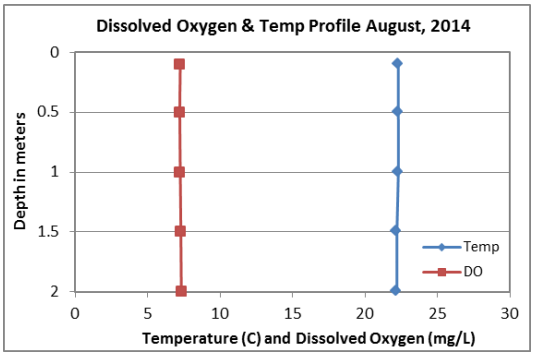
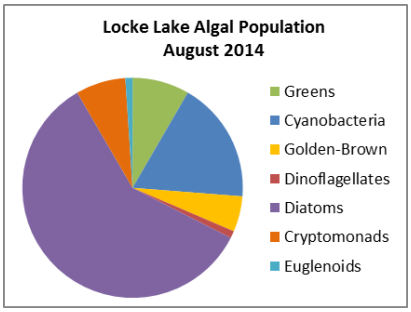
2014 Data Summary

Observations and Recommendations (*Refer to Table 1 and Historical Deep Spot Data Graphics)*

- **Chlorophyll-a:** The 2014 chlorophyll level increased slightly from 2013 and was slightly above average for most NH lakes. Visual inspection of historical data indicates relatively stable chlorophyll levels between years.
- **Conductivity/Chloride:** Epilimnetic (deep spot) conductivity and chloride levels were slightly greater than the state medians and visual inspection of historical data indicates increasing (worsening) conductivity in the lake. Tributary conductivity and chloride levels were also slightly greater than the state medians.
- **Total Phosphorus:** Epilimnetic phosphorus increased sharply from 2013 and was elevated following a significant rain event. Visual inspection of historical data indicates slightly variable epilimnetic phosphorus levels. Munroe Inlet, North Barnstead Rd. Beach and Outlet phosphorus levels were slightly elevated and the turbidity was also slightly elevated indicating potential sediment from stormwater runoff contributed to the elevated phosphorus levels.
- **Transparency:** Transparency was good and the Secchi disk was visible on the pond bottom in August. Visual inspection of historical data indicates stable transparency.
- **Turbidity:** Epilimnetic, Munroe Inlet, North Barnstead Rd. Beach, and Outlet turbidities were all elevated. Elevated levels of algal growth in the lake as well as a stormwater runoff from a significant storm event prior to sampling may have contributed to the elevated turbidities.
- **pH:** Epilimnetic and tributary pH levels were within the desirable range of 6.5—8.0 units. Visual inspection of historical data indicates relatively stable epilimnetic pH.
- **Recommended Actions:** Increase monitoring frequency to three times per summer, typically once per month in June, July and August. This will help to decrease data variability between years to allow better assessment of seasonal and historical water quality trends. A significant storm event occurred prior to sampling and water quality results indicate potential stormwater runoff issues in the watershed. Educate lake and community residents on ways to reduce stormwater runoff from their properties utilizing DES' "NH Homeowner's Guide to Stormwater Management". A new initiative called Soak up the Rain NH can also help to assist communities in implementing stormwater management controls. For more information on Soak up the Rain NH visit http://soaknh.org/.





Station Name	Table 1. 2014 Average Water Quality Data for WEBSTER STREAM - LOCKE LAKE								
	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	Total P ug/l	Trans. m		Turb. ntu	pH
						NVS	VS		
Epilimnion	5.3	6.08	15	76.2	20	2.50	2.50	3.28	6.55
Inlet			10	61.1	9			1.18	6.70
Munroe Inlet			15	80.1	23			3.89	6.56
North Barnstead Rd. Beach				76.0	24			3.60	6.56
Outlet				78.2	19			2.06	6.65

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m^3
Conductivity: 40.0 uS/cm
Chloride: 4 mg/L
Total Phosphorus: 12 ug/L
Transparency: 3.2 m
pH: 6.6

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between 6.5-8.0 (unless naturally occurring)

Historical Water Quality Trend Analysis

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	N/A	Ten consecutive years of data necessary for analysis.	Chlorophyll-a	N/A	Ten consecutive years of data necessary for analysis.
pH (epilimnion)	N/A	Ten consecutive years of data necessary for analysis.	Transparency	N/A	Ten consecutive years of data necessary for analysis.
			Phosphorus (epilimnion)	N/A	Ten consecutive years of data necessary for analysis.